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INTERNATIONAL SYMPOSIUM ON APPLIED MILITARY PSYCHOLOGY (17TH) H--ETC(U)  
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## O.N.R. LONDON CONFERENCE REPORT

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17TH INTERNATIONAL SYMPOSIUM ON APPLIED  
MILITARY PSYCHOLOGY

NICHOLAS A. POND, Jr.

1 July 1981

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SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER C-3-81	2. GOVT ACCESSION NO. AD-A103911	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) 17th International Symposium on Applied Military Psychology (1981). Portugal, May 1981.		5. TYPE OF REPORT & PERIOD COVERED Portuguese
6. AUTHOR(s) Nicholas A. Bond, Jr.		6. PERFORMING ORG. REPORT NUMBER C-3-81
7. CONTRACT OR GRANT NUMBER(s)		
9. PERFORMING ORGANIZATION NAME AND ADDRESS Office of Naval Research, Branch Office London Box 39 FPO New York 09510		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS 11
11. CONTROLLING OFFICE NAME AND ADDRESS 12 11		12. REPORT DATE 1 July 1981
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 14 ONI/C-3		13. NUMBER OF PAGES 15
16. DISTRIBUTION STATEMENT (of this Report) APPROVED FOR PUBLIC RELEASE/DISTRIBUTION UNLIMITED		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE Unclassified
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		Accession For NTIS GRA&I DTIC TAB Unannounced Justification
18. SUPPLEMENTARY NOTES		By _____ Distribution/ _____ Availability Codes/ _____ Avail and/or Dist Special A
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) personnel selection job satisfaction criteria stress interviewing women in the military mental testing military effectiveness mathematical achievement recruitment performance		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The topic of the 17th International Applied Military Psychology Seminar was "Psychological Prediction and Measurement of Individual and Unit Effectiveness." Twenty-two papers and ensuing discussions are summarized under six headings: Selection, Critiques of Selection, Job Satisfaction, Long-term Effects of Stress, Women in the Military, and Projective Testing.		

## 17TH INTERNATIONAL SYMPOSIUM ON APPLIED MILITARY PSYCHOLOGY

INTRODUCTION

The 17th International Symposium on Applied Military Psychology was convened at Portuguese Air Force Base #1, near Sintra, during the week of 18-22 May 1981. Thirty-four people from 14 countries were present (see appendix); 22 formal papers were given over the 5 days. While the overall theme of the symposium was "Psychological Prediction and Measurement of Individual and Unit Effectiveness," delegates were free to introduce any projects or issues which fell within the broad purview of military psychology. As the symposium proceeded, a few subthemes became evident, and so this summary report is organized around six of them.

ROUTINE SELECTION PROCEDURES

Many representatives offered descriptive accounts of their present methods for screening entry-level pilots, officer candidates, technical trainees, and so on. There were common features across countries, reflecting the universal adoption of the classical selection paradigm of industrial psychology. Applicants appear at selection centers; always there is a physical exam, some kind of aptitude or achievement test battery, and a review board. Pilot candidates may have to pass stringent vision and motor-coordination cutoffs. Sometimes the whole selection system is managed through a computerized data-base concept, with each new person having a "disc record space" allocated to him, and filled with data as his military career proceeds. There may be personality inventories, leaderless group sessions or projective measures. Several interesting special tests are now being used: A. Bohrer (Belgium), for example, showed pictures of a group of five or six officer candidates doing some "construction" tasks. One job was to make a large arch from some plywood "stones"; another was to build a "model town"; and still another was to put together a functional tube structure, using pipes and clamps. While the candidates attempt to do these things, an officer stands by with a clipboard, scoring them on various attributes. The men are rank-ordered at the end. Steege (W. Germany) noted that, in his operation, technical-apparatus tests have higher validity than do paper-pencil measures. Portugal uses a round-table exam, wherein a small group of people discuss a general-knowledge topic. There is also an "obstacle" test, and here the examinees are watched for those behaviors believed to be associated with an ideal military approach (coolness under frustration, directed attention to the problem, etc.). A planning project is also undertaken, with satisfactory performance requiring good management of both intellectual and risk-taking aspects.

Despite the uniformity of approach in such areas as pilot selection, many attendees believed that the validity of the standard selection system is not very satisfactory. Aiken (US) observed that one reason for this is the remoteness of the criterion: tabulations can be made of passes and fails in a long course of training, and those scoring high on the selection-battery "surrogate" measures may indeed have a lower attrition or "wastage" rate than the low-scoring candidates. But failure can occur for many different reasons; and so a simple correlation does not illuminate the actual

behavioral requisites very much. Perhaps for this reason, Israel, the US, and other countries are tending to address the real problem not as a screening or selection problem, but as a performance problem. This approach says: look very closely at your task demands, and at the "little behaviors" that have to be emitted. If ordinary people cannot deliver the desired behaviors, then you should focus on aiding and training, or perhaps on changing the tasks themselves, so that they can be performed readily. When the detailed task analysis and task re-engineering is done, selection is no longer critical because now anybody can do it. Another way to put this point: whenever task engineering gains an inch, selection psychology loses a mile.

Several attendees felt that a scholarly review should be done of all the test instruments, reliability and validity coefficients, and personnel evaluation models now operating in military psychology. In all likelihood, such a review would lead to more standardization of selection models among the developed countries. Right now, the aptitude batteries are all slightly different from each other, and the cutoff scores are not always rigorously set.

High mathematics achievement is desired, or even necessary, for elite military positions such as aircraft pilot, navigator, and engineering officer. But in these days of volunteer military, there is often not enough mathematical talent in the applicant cohort. It is interesting that four different countries have managed this "mathematics problem" in different ways. Portugal's political revolution in 1974 produced a serious disruption of the ordinary high-school science and math instruction during the late 1970s, and so very few of the recent Naval Academy applicants could pass the math screening test. Portugal's answer is to substitute general intelligence scores (Cattell's "G") for mathematics; and indeed their research shows that if a G score higher than 30 is attained, then a student can master sufficient mathematics while in the Academy. According to Stracca (Italy), the Italian Navy provides remedial mathematics training, if necessary for some weeks, to its officer candidates who have math deficiencies but who are otherwise suitable. Most of them, it appears, can be brought up to standard. Denmark immediately rejects those men who want to be pilots and have insufficient math achievement; but the selection center also counsels each rejected applicant individually, tells him exactly what math courses should be completed in order to qualify, and urges him to reapply, say some months later, when the additional math preparation has taken place. Britain's approach is different from all the others: it gets high-quality math talent by paying students to attend a university; after graduation, the cadet only has to take a short OCS course before commissioning. By this means, the military can obtain its share of the much-sought-after corps of technical graduates.

Skelly (UK) showed how self-appraisal might contribute some unique validity to the selection process. His approach assumes that, when furnished with a realistic view of learning and task demands in a given situation, people are often quite able to estimate their own suitability for that situation; perhaps the most realistic exposure can be gained by means of a physical immersion in the real situation. For example, the UK gives potential officers a 2-day residential course at a commando training camp. This exposure reduces training wastage by 10% or so; and there are indications

that although many people "select themselves out," there is no reduction in effective personnel intake. The experience also seems to have increased the average selection-board assessment mark. According to Shelly, the US Marines recently obtained a similar result simply by showing a realistic film to potential enlistees. This film "tells it like it is": it honestly depicts some of the disagreeable and stressful aspects of basic training, and omits the glamour shots of square-jawed marines gazing into a Pearl Harbor sunset.

Several participants furnished validity information regarding their selection procedures. Stracca, for instance, reported that his rating procedure for Naval Academy applicants not only predicts success-failure in the 3-year course, but also is highly correlated with evaluations some 10 years later, when the former cadets are at the lieutenant or lieutenant-commander level in their careers. His correlations are unusually high for such long-term forecasting.

Walker (Canada) not only described his country's entry selection procedure, but also provided copies of training-evaluation forms that are used as a pilot or navigator trainee moves through a military flight career. Many scores, from the usual bio-data to "officer development" ratings, flight training segments, and attitude questionnaire results, are collected on each person; but all these data are kept in a centralized system, and individual score parameters are not available to the training staff. Since all the data are assembled in one place, some of the applications of the system come from reviewing the summary tables that are printed out. In one case, it was possible to reduce flying hours, with substantial cost savings. On another occasion, the central tabulation suggested the relocation of one training unit as a means of reducing failure rates; and the data system was later able to confirm that the expected reduction actually did occur. Many attendees anticipated in their own countries a similar centralization of personnel data. One possibility that apparently has not been fully exploited is to interrogate a personnel data base in a "search" mode. Hypotheses about personnel availability and capability can often be checked quickly, if the data base itself is set up to permit the right kinds of inquiry. Many of those present thought that we already know many of the questions that are being asked now and that will continue to be asked. The accessibility of a data base to facilitate exploration of these questions might become an important personnel management tool within the next few years. It is already possible, as at the US Navy Personnel Research and Development Center and elsewhere, to simulate the effects of certain personnel policy actions.

Carlstedt (Sweden) gave an account of two innovations in the Swedish Air Force personnel pipeline. Instead of giving "all tests to all candidates," the cheaper tests are now given first, and a successive-barrier or multiple-cutoff selection logic is employed. This method reduces the number of (fully-tested) candidates who have to go through the whole selection procedure.

Sweden's second innovation was initiated in 1973; it was inspired by the failure rate, which was becoming unacceptably high. In 1968 there were 495 applicants; 79 of these were accepted, but only 19 pilots finally

emerged—not enough to meet requirements. It was believed that instructors tended to view the student pilots as "objects"—who would have to perform so many exercises and fly so many hours. Principles derived from organization development were employed to change the attitudes of the instructors. Group sessions served to inform the instructors of the many stresses and fears perceived by the students, and what the high "culling out" rate did to the trainee's self-image, and to his ease of learning. Presumably as a result of these sessions, instructors began to put the student "at the center" of the learning process, and to appreciate student feelings so that favorable learning conditions would be obtained. The present high pass rate of 80% was taken as an indication of the value of the instructor-student group sessions. This seems to be one of the few applications of group dynamics ideas in elite military training.

Jellison (UK) observed that, in his country, the level of unemployment is a principal driver of army recruitment; when there are lots of jobs, enlistment drops, and vice versa. With a 20% decline in the 17-25 age cohort since 1970, there will probably be some continuing problems in getting good people. As in other countries, British tabulations show that the higher quality people are less likely to waste out of the service once they are enlisted. A possibly unique feature in the British Army is maintenance of long-term, famous, and regionally-based military units. These differ considerably in their wastage; only about 20% waste out of the Scottish regiments, whereas in the "Household" (London-area) units, about 50% wastage is observed. Jellison reported that in Britain, the pay issue was not crucial to reenlistment. Aiken contrasted this conclusion with US econometric results, which showed relative pay levels as extremely important determinants of enlisted military commitment. As both participants noted, in such cases of contrary findings, the same analytical methods should be applied to data from both countries. Statistical methods for "holding things constant" are variously applicable, and variously effective, in complex matters like pay elasticity. This is probably another area where some carefully planned cross-national comparisons would be worthwhile.

Frederick Fiedler's leadership model has often been explored in military settings. Some of the earliest studies into LPC (Least Preferred Co-Worker) variables were done with the Belgian Army, many years ago. In his paper, Jesuinos (Portugal) looked at the relationship between LPC scores and performance in two situations where leadership behavior could be displayed. On the basis of Fiedler's original work, certain predictions were made and then tested. In the event, high LPCs scored well in both situations (one task situation was judged to be favorable, the other unfavorable); low LPCs were good in the more-favorable situation only, with intermediate LPCs being low in both task settings. While these results do not conform to Fiedler's predictions in detail, they make sense, and the quality of leadership exhibited may be moderated by overall leader-member relations obtaining in the groups. The norming of Portuguese LPC scores which took place in these studies was a necessary step to validating this particular model further. One set of questions raised about this study: what has been the fate of Fiedler-inspired leadership concepts in the military organizations of other countries; and what practical changes have come about, starting from that particular theoretical base?

CRITIQUE OF THE CLASSICAL SELECTION MODEL

The classical selection paradigm rests on the existence of well-defined (and preferably objective) criterion measures, some effective predictor measures, and a rigorous plan for relating these two kinds of scores into a practical system. The Netherlands contingent provided some disturbing comments on each of these key aspects. J. van de Wetering considered the problems in estimating military effectiveness at the person or unit level, and he also tried to estimate what value could be attached to present "effectiveness measures." On his analysis, the measurement problems involved are intrinsically difficult, perhaps so difficult that the present outcome measures are useless. If "objective" indexes are available, then those will tend to be overemphasized while more important but less measurable aspects are ignored. At least in the Dutch Army, a nominal "effectiveness" concept may get distorted into a vague, personalistic, and psychohygienic base for personnel decisions. An example: in one Dutch Army training center, it was found that the criteria of effectiveness being used were such items as "keeping in the background during group discussions," "not using too much initiative," "not being too effective in duties," and so forth. Success, then, was actually being defined as keeping a low visibility and not making waves. And according to van de Wetering's analysis, the situation cannot be remedied simply by choosing harder and more definite criteria. This is because the real objectives for an army are continuous and multivariate, and can be determined only if there is a situation which the army wants to prevent. The overall conclusion is pessimistic: given present conditions, military effectiveness measurement is so incomplete and difficult as to be not worthwhile. Some delegates believed that this stance was too pessimistic; after all, you can measure certain aspects of performance (response lags, probabilities of launching a missile or weapon successfully, likelihood of receiving a correct message, and so forth), and there can be no doubt of the usefulness of these measures in some cases.

Harsveld (Netherlands) took the predictor side of the selection paradigm, and discussed the "to test or not to test" issue. He proposed that we begin with the conception of test utility, not test validity. The utility of a personnel procedure depends on the new information that it adds to already existing information. As one illustration of possible utility, a test battery could contribute valuable information about a country's "intellectual reserve," or about those people (often from the lower classes) who have more capacity than is indicated by their educational level. You could then discover which members of this reserve had the best chance of learning complex technical material, or of finishing a difficult course of one kind or another. Exactly this procedure is followed in wartime. However, as Harsveld points out, when educational opportunities are available to all, as in postwar Holland, then people tend to achieve educational levels in direct proportion to their capabilities; and so you can use educational data directly for predicting performance, and ignore the test scores. In fact, when a critical trial was run for a Dutch Army sample, the information produced by a test battery was much less than the expected information value ( $i_1$  bits). This was because, given the educational level, membership in test-score categories can be predicted accurately. Harsveld's message, then: stop testing, unless an information-value analysis confirms the utility of testing. Harsveld's formulation in terms of "bits of produced information" may be useful to

those who are concerned with screening procedures; one can imagine a practical bits/testing-cost tradeoff for making test policy decisions.

Catlim and Barata (Portugal) presented some validity data which is fairly consonant with the Dutch pessimism. Eighty-two pilot cadets took an individual and group test battery, and also appeared before a selection jury. All scores were then correlated against a graduate/not-graduate pilot criterion. The jury ratings correlated significantly with the criterion, whereas test results alone did not. Perhaps the jury was picking up nonintellectual traits, which the training system utilized later for eliminating candidates. Another Portuguese study explored the origins of enlisted specialty volunteers and of pilot training cadets. Men in both categories perceived themselves to be middle class; but the pilot applicants came from the most developed areas of the country where educational opportunities were greater.

In his prediction studies, Aiken began with the criterion issue. He observed that the practice of using training school grades and fitness ratings as criteria can never reflect true job performance; such measures are, at best, proxies or surrogates. To get closer to the actual job situation, Aiken's team has started from the presumably "ultimate" job requirements. In one study, the job of the sonar technician was broken down into some 350 separate tasks. Human performance on a sample of these task elements could then provide a rather direct estimate of job success. When a predictor test battery was especially keyed to this kind of a job-sample measure, Aiken found that better job performance could be predicted and achieved, and that this could be done without increasing school attrition. His evidence is encouraging enough to support a generalization: you won't go far wrong if, in your prediction studies, you start with the "end-behaviors" desired. Such a policy would mean that instead of a general selection battery made up of verbal and numerical items, more specific sets of predictors would have to be assembled.

#### JOB SATISFACTION OF MILITARY PERSONNEL

At the beginning of his paper, Puzicha (West Germany) laid out four conditions that nearly all countries now face regarding high-quality junior military personnel: diminishing numbers of initial enlistments, decreasing readiness for voluntary service in the conscript population, decreasing numbers of voluntary soldiers ready to reenlist after the first tour, and declining birth rates. (Aiken noted that, in some countries such as the US, there are also indications that the average input quality has been lowered in recent years.) Everybody knows that these conditions are already producing shortages; in West Germany, there is now about 16% understaffing of junior noncommissioned officers, and in some US technical specialties such as data systems technician, the shortage is much worse than that. Since part of this problem can be conceptualized in "job satisfaction" terms, investigations have been directed toward the attitudes held by present enlistees.

Puzicha's questionnaire results from a large West German sample ( $N > 1500$ ) showed that job attitudes were discernibly different among the three forces and also different among the categories of enlistees (compulsory, voluntary for short term, voluntary for long term, and so forth).

For all groups and for all criteria taken together, an "affinity for the military" is the most powerful predictor. This variable was measured by answers to questions about the acceptability of barracks life, uniforms, command, and obedience to orders—the features that are central to military life. For "reenlistment readiness," affinity for the military was again ranked first, but for many men the attitude of the wife/girlfriend toward the enlistment was also stated to be of great importance. The research people in West Germany believe that, for a majority of soldiers, affinity for the military is low; and when this is accompanied by resistance of the female partner, there is almost no chance of reenlistment, and essentially no hope of influencing that decision by giving higher pay, improved leadership, or anything else. But for those who do display a tolerance or a liking for military conditions, there is much that can be done. As one illustration, "perception of superiors" is ranked as very important for long-term enlistees, and for this subgroup, the provision and training of leaders that consider the needs of their men could be a decisive influence. There was an informal consensus that countries who are doing military job-satisfaction studies should exchange data regarding the impact of interventions (planned or unplanned!) upon perceived role satisfaction, since interventions often do occur for political reasons. At the moment, the effects of interventions on attitudes remain largely speculative. Some panel-design results from West Germany yielded a result of some theoretical interest: military participation decisions are not usually as contingent upon competing value systems as they are upon rational weighing of the alternatives and upon perceived reference-group affiliations. Value adjustments, after the enlistment decision, are believed to serve as rationalizations for the already-committed behavior, rather than as determinants.

Zevulun (Israel), in perhaps the most theoretical paper of the symposium, studied military satisfaction via the Guttman psychometric approach. Three facets (the referent group, the area of evaluation, and the type of specification) were defined. Each facet was broken down further. The "referent group" facet, for example, had two subreferents: the platoon commander ( $a_1$ ), or the company commander ( $a_2$ ). Area of evaluation covered professional ( $b_1$ ), interpersonal ( $b_2$ ), or disciplinary ( $b_3$ ). Type of specification was organized into general ( $c_1$ ) or specific ( $c_2$ ). Thus, an  $a_1$ ,  $b_2$ ,  $c_2$  evaluation sentence might ask how you regard your platoon commander as a friend, and how many times you talk personally to him in a month. Sentences were constructed to encompass all the permutations.

Intercorrelations among the variables (reactions to sentences on a five-point scale) were then compiled and analyzed into a smallest-space analysis. The final result was the "minimum" structure that could reproduce the interactions among the variables. This kind of structure has some analytical advantages. It can organize the data in a way which has some theoretical rationale, and which is something more than just an array of empirical correlations. Previous psychometric research indicates that intelligence and other psychological domains can be understood via a smallest-space structure, and that success encourages its use in an applied field like military job satisfaction. For Zebulun's particular data set, the material was depicted nicely in a "cylindrex" spatial representation.

Several representatives observed that morale is higher at predictable times in the training regime, and varies also among certain groups taking the same course or performing the same duty. The haunting question, though, is whether applied psychology can do anything much about attitudes which continue to be against an old-fashioned military life and to tend toward a "do your own thing" concept. There were some apparent international differences on the extent to which female-partner and family requirements affect job satisfaction in the military, with West Germany and the US being more aware of those features than are most other countries.

There are some continuous job-satisfaction evaluation schemes now in operation. Most of these use the University of Michigan questionnaires or some variant of them; and they are designed to furnish military leaders with regular information on leadership, the expressed needs of the men, and feelings about organizational climate.

During informal "rump sessions," it was noted that a few techniques from industrial psychology seem not to have been applied in the military. For instance, though most countries have heard of it, there is yet no attempt to apply the human-resource accounting concept to military organization, and to estimate the "value" of the people in a unit. Another unexploited possibility concerns goal-setting: it is known that self-establishment of moderately difficult goals can be a powerful motivator, for individuals and for small groups. But military goals are usually set from the top down, and so they may not benefit from the self-setting feature.

The "job design" or job enrichment movement embraces several ideas which have been effective in applied settings. It is postulated that jobs will be enriched when the work itself is made more interesting and intrinsically challenging, when the worker is free to develop new ways of doing things, and so forth. While an immediate response is, "you can't do that in the military," for many jobs you might indeed undertake a job-enrichment program. After all, a large fraction of military activity is essentially industrial in nature; most troops do not engage in combat-type activities, but perform regular work in shops, offices, and warehouses. At US military bases, a few job-enrichment interventions have been tried with civilian workers, generally with some success; an example is the work with keypunchers at Long Beach Naval Shipyard. Of course, some people will not respond to job enhancement efforts or to changes that make work more intrinsically motivating; their major life meaning comes from sources outside work. Again, a need was expressed to review any job-design studies that have been done in West European military forces.

#### STRESS EFFECTS

Several countries are doing things in the stress-measurement area. West Germany studied a sample of 115 soldiers who attempted suicide, and concluded that the attempt occurs as a coincidence of life stress, individual personality resources, and social support conditions. At the 1980 meeting at Amsterdam, Israel presented an analysis of its decorated heroes from the Yom Kippur war. At the present meeting, Pereira (Portugal) gave the findings of a long-term followup of Portuguese marines who had served in Angola, Guinea, and Mozambique. From 1961 to 1974, there was often counterguerilla activity

in those places, and many Portuguese marines pulled one or more 18-month overseas duty assignments. As a psychiatrist who served overseas himself with many of the marines, Pereira was especially interested in the symptoms of those who served more than one overseas tour. Some years later, he still observes in those men symptoms of nervousness, frequent episodes of explosive aggressiveness, and great difficulty with new complex tasks. The clinical picture resembles somewhat that which is observed in cases of "supraliminal brain damage," and Pereira's long-duty marines have Stroop test scores which are about half-way between those of normals and schizophrenics. An interesting side observation in the original work was that, when a combat group got news that a military operation was to take place in the next two or three days, the general activity level would increase; there would be more smoking, drinking, sexual activity, and letter writing (all these could be measured objectively). Furthermore, Pereira kept track of the "subjective probability" of danger perceived by the men about the upcoming operation. There was a very high correlation ( $r=.87$ ) between subjective anticipated danger and general activity. This anticipation may well be the "alarm phase" of Selye's stress adaptation syndrome; in any case, it seems to have the strong adrenal and circulatory involvement that Selye described. The repeated exposure to dangerous situations certainly has a cumulative effect. After two or more periods of combat exposure, the long-term symptoms noted above persist, and little can be done to reverse the clinical picture.

The "permanent" Portuguese cases serve as a reminder of the Nigerian experience in the 1966-68 civil war in that country. The Nigerian government evacuated 6,000 psychiatric casualties and put them in camps where they were allowed to rest without working. Ten years later, in 1978, half of the casualties were still in the camps.

In his later work, Selye distinguishes between "good stress" and "bad stress"; in the former case, the altering and arousal mechanisms serve to maintain behavior at a high level, but on intrinsically rewarding tasks. Bad stress, though, involves those situations where the individual would, if given the choice, leave the field. As the Portuguese follow-up shows, when you can't leave the field, permanent damage is likely to follow. Following Pereira's paper, there was some informal discussion of the possibility of measuring individual susceptibility to stress. West Germany has recently published a paper reviewing the methods available, and finds all of them unsatisfactory in some respects. There are some Scandinavian studies of stress measurement via physiological techniques, but these have not been used in military populations.

#### PROJECTIVE TESTS IN THE MILITARY

Industrial psychology has found that projective tests are seldom reliable or valid enough for practical use. However, there are still attempts to use projective materials in screen-batteries and in clinical interviews. Leaderless group discussions can be largely projective, and some of the screening tasks mentioned earlier are relatively unstructured, with no evident right-and-wrong answers. Denmark and Sweden have been experimenting for some years with a projective test called DMT (Defence Mechanism Test), and while this instrument is not ready for public release and critique,

Termøhlen (Denmark) and Carlstedt (Sweden) cited some encouraging results with it. Since 1975, the Danish Air Force has been taking DMT scores, in the hope that DMT could indicate such tendencies as the ability to withstand stress, and a person's disposition to neurotic behavior. When the DMT protocols were scored as either plus "+", or minus "-", it turned out that about 85% of the persons with "+" scores passed, compared to a passing rate of only about 35% in the "-" score group. These results were parallel to experiences in the Swedish force, which also registered a strong decline in accidents after using DMT for selection.

The validity data regarding DMT were surprising enough to cause several remarks on the evaluation techniques employed. Few practical validity studies are free from criticism, and the early positive experiences with DMT certainly need confirmation. As in the case of the general test critique offered by the representatives from Holland, the ultimate question will revolve around the unique predictive contribution made by DMT. Some queries were also expressed about the defense mechanism concept itself. Though a dozen or so defense mechanisms have been catalogued by Freud and others, there is little solid evidence that individual preferences in formulating and adopting these mechanisms is predictive of interesting behavior. Perhaps at subsequent meetings, the DMT test rationale and procedures can be more fully described, so that replication can be carried out.

#### UTILIZATION OF WOMEN IN NEAR-COMBAT ENVIRONMENTS

In his presentation, Resch (Canada) showed that the Canadian forces are certainly among the world leaders in offering a wide range of military positions to women. There are already a few Canadian females serving as pilots; some females also may be found in sea trials aboard tenders, and in the "hardship" posts north of the Arctic Circle. This widening band of opportunity reflects general changes in the culture, of course; but the Canadian forces are also doing specific projects which are exploring the problems, and the payoffs, of getting women "closer to the action." In a Canadian transportation unit close to the East German border 10% are now women, and this fraction is being raised to some 15%, or 100 women in a force of 650. The Canadians have an interesting structure for explicating the criterion problem. According to their model, the factors producing military effectiveness can be split up into three categories, as follows:

<u>Task Factors</u>	<u>Individual Factors</u>	<u>Group Factors</u>
Training	Confidence	Morale
Skill	Courage	Cohesion
Team work	Stamina	Leadership
Motivation	Discipline	Esprit
Satisfaction		
Equipment		

Each one of these dozen or so variables can be measured. Thus, the adequacy of "teamwork" can be assessed by unit records; "motivation" can be estimated by a social climate scale; high or low skill levels show up in critical

incident reports; morale measurement comes from interviews by a visiting team, and so forth. There are also professional reports from people like chaplains, MPs, and social workers. The Canadians believe that their effectiveness-measurement system is good enough to point up the problems which eventuate when women are introduced into units in large numbers, and they think it is also sensitive enough to indicate corrective actions. So far, according to Resch, the experience is quite positive, and there is nothing to suggest that the trend toward broad female participation will not continue. Among the documents Resch presented was the Field Social Climate Scale, which is used to estimate such attributes as peer cohesion, Officer/NCO support, and clarity in Canadian units. Cross-national studies with this instrument might be very appropriate, since services in all countries are concerned with these variables.

#### CONCLUDING REMARKS

Applied military psychology is clearly vigorous in the dozen or so countries who sent delegates to this meeting. Considerable across-nation variance can be seen in the methods applied to specific problem areas, as we saw in the mathematics-ability issue; but workers in all countries seem to read much of the same literature, and to approach most problems from the standpoint of classical personnel psychology. Methodological and sampling problems appear in some of the work, but these limitations are often a product of the intrinsic difficulties of doing staff studies in a "line" military environment.

As the papers were presented and the discussion went forward, a couple of trends were more or less discernible, at least to the author of this summary. One of these was that staff research people in the military are now getting out of the personnel office and closer to target behaviors, in the schools and on the job. Lord Nelson supposedly told his commanders that, when in doubt about what to do, you can't go far wrong by getting alongside the enemy and opening fire. In the military psychology domain, a similar injunction seems to be emerging: you can't go far wrong by getting closer to the field behaviors. This willingness to get our hands and clipboards dirty is certainly a desirable development. In future meetings, we can probably expect to hear more about realistic settings, and about evaluation procedures that go beyond paper and pencil correlations and simple counts of training success.

A second issue is more unsettled and more technically difficult, and it is far from clear how it will be met. I refer again to utility. The issue is not only whether or not our procedures work, because all of them work, at least to some degree, or we revise them until they do. But when they do work, what is the value of the personnel decisions made with their aid? Sometimes a hint of an answer can be seen; a representative from one of the European air forces was able to give a rough "dollar figure" for what it cost to keep an eventually unacceptable cadet in pilot training for some months. In this case, we might expect that the cost of false-positive misclassification could be estimated directly. But the cost-benefit analysis of many of our procedures is still woefully inadequate. A complete utility analysis would require costs and benefit values for all four cells in a prediction table (positive and negative "hits," false

positives, false negatives). Maybe several papers in the 1982 meeting could look at utilities in the military personnel domain. With people costs constituting half or more of the military budget in some countries, the payoff potential for estimating utility, and for increasing it, is itself a high-utility prospect.

Judging from the papers discussed at this meeting, there are very few occasions wherein recent advances in cognitive psychology are being used in the military organizations of Western Europe. The same could be said of such areas as decision aiding, instructional technology, and simulation; not a single mention was made of criterion-referenced or adaptive testing, of Bayesian probability-processing schemes, or of the newer kinds of task analysis. There are various reasons for this apparent state of affairs: the pressure on military personnel research groups for immediate applicability, persistent funding limitations for expensive computer-aided devices, conservatism of the training establishment, and so on. Nevertheless, it might be a good idea for somebody to collect the ideas from these "hot" areas of psychology, and to provide a review of those that might have fairly immediate military potential in Western Europe.

## APPENDIX

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ON APPLIED MILITARY PSYCHOLOGY

18-22 MAY 1981

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